

# HD74LV2GT14A

Triple Inverters with Schmitt-trigger Inputs / CMOS Logic Level Shifter

REJ03D0141-0200Z (Previous ADE-205-666A (Z)) Rev.2.00 Oct.16.2003

#### **Description**

The HD74LV2GT14A has triple inverters with Schmitt-trigger inputs in an 8 pin package. The input protection circuitry on this device allows over voltage tolerance on the input, allowing the device to be used as a logic–level translator from 3.0 V CMOS Logic to 5.0 V CMOS Logic or from 1.8 V CMOS logic to 3.0 V CMOS Logic while operating at the high-voltage power supply. Low voltage and high-speed operation is suitable for the battery powered products (e.g., notebook computers), and the low power consumption extends the battery life.

#### **Features**

- The basic gate function is lined up as Renesas uni logic series.
- Supplied on emboss taping for high-speed automatic mounting.
- TTL compatible input level.

Supply voltage range: 3.0 to 5.5 V

Operating temperature range: -40 to +85°C

• Logic-level translate function

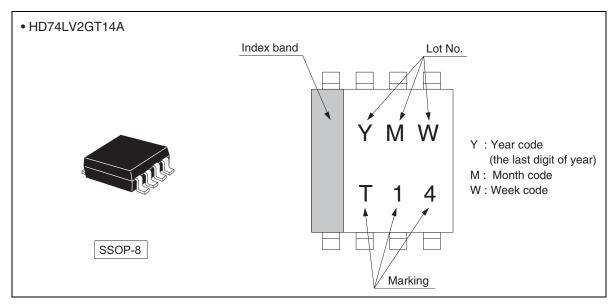
3.0 V CMOS logic  $\rightarrow$  5.0 V CMOS logic (@V<sub>CC</sub> = 5.0 V)

1.8 V or 2.5 V CMOS logic  $\rightarrow$  3.3 V CMOS logic (@V<sub>CC</sub> = 3.3 V)

- All inputs  $V_{IH}$  (Max.) = 5.5 V (@V<sub>CC</sub> = 0 V to 5.5 V) All outputs  $V_{O}$  (Max.) = 5.5 V (@V<sub>CC</sub> = 0 V)
- Output current  $\pm 6$  mA (@V<sub>CC</sub> = 3.0 V to 3.6 V),  $\pm 12$  mA (@V<sub>CC</sub> = 4.5 V to 5.5 V)
- All the logical input has hysteresis voltage for the slow transition.
- Ordering Information

Part Name	Package Type	Package Code	Package Abbreviation	Taping Abbreviation (Quantity)		
HD74LV2GT14AUSE	SSOP-8 pin	TTP-8DBV	US	E (3,000 pcs/reel)		

## **Outline and Article Indication**



#### **Function Table**

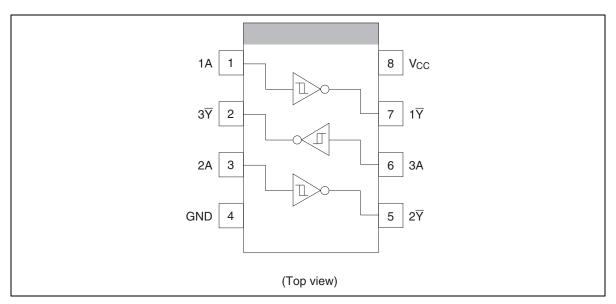
 Input A
 Output ▼

 H
 L

 L
 H

H : High level L : Low level

#### **Pin Arrangement**



## **Absolute Maximum Ratings**

Item	Symbol	Ratings	Unit	<b>Test Conditions</b>
Supply voltage range	V <sub>CC</sub>	-0.5 to 7.0	V	
Input voltage range *1	Vı	-0.5 to 7.0	V	
Output voltage range *1, 2	Vo	-0.5 to V <sub>CC</sub> +0.5	V	Output : H or L
		-0.5 to 7.0	<del></del>	V <sub>CC</sub> : OFF
Input clamp current	I <sub>IK</sub>	-20	mA	V <sub>I</sub> < 0
Output clamp current	lok	±50	mA	$V_O < 0$ or $V_O > V_{CC}$
Continuous output current	Io	±25	mA	$V_O = 0$ to $V_{CC}$
Continuous current through V <sub>CC</sub> or GND	I <sub>CC</sub> or I <sub>GND</sub>	±50	mA	
Maximum power dissipation at Ta = 25°C (in still air) *3	P <sub>T</sub>	200	mW	
Storage temperature	Tstg	-65 to 150	°C	

Notes:

The absolute maximum ratings are values, which must not individually be exceeded, and furthermore no two of which may be realized at the same time.

- 1. The input and output voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
- 2. This value is limited to 5.5 V maximum.
- 3. The maximum package power dissipation was calculated using a junction temperature of 150°C.

## **Recommended Operating Conditions**

Item	Symbol	Min	Max	Unit	Conditions
Supply voltage range	V <sub>CC</sub>	3.0	5.5	V	
Input voltage range	VI	0	5.5	V	
Output voltage range	Vo	0	V <sub>CC</sub>	V	
Output current	I <sub>OL</sub>	_	6	mA	V <sub>CC</sub> = 3.0 to 3.6 V
		_	12		V <sub>CC</sub> = 4.5 to 5.5 V
	I <sub>OH</sub>	_	-6		$V_{CC} = 3.0 \text{ to } 3.6 \text{ V}$
		_	-12		V <sub>CC</sub> = 4.5 to 5.5 V
Operating free-air temperature	Ta	-40	85	°C	

Note: Unused or floating inputs must be held high or low.

#### HD74LV2GT14A

#### **Electrical Characteristic**

•  $Ta = -40 \text{ to } 85^{\circ}\text{C}$ 

Item	Symbol	V <sub>CC</sub> (V) *	Min	Тур	Max	Unit	Test condition
Input voltage	$V_T^+$	3.0	_	_	1.5	V	
		3.6	_	_	1.6	_	
		4.5	_	_	1.9	_	
		5.5	_	_	2.1	_	
	V <sub>T</sub>	3.0	0.3	_	_	_	
		3.6	0.4	_	_	_	
		4.5	0.5	_	_	_	
		5.5	0.6	_	_	_	
	$\Delta V_T$	3.0	0.3	_	1.2	_	
		3.6	0.3	_	1.3	_	
		4.5	0.4	_	1.4	_	
		5.5	0.4	_	1.5	_	
Output voltage	V <sub>OH</sub>	Min to Max	V <sub>CC</sub> -0.1	_	_	V	I <sub>OH</sub> = -50 μA
		3.0	2.48	_	_	_	$I_{OH} = -6 \text{ mA}$
		4.5	3.8	_	_		I <sub>OH</sub> = -12 mA
	V <sub>OL</sub>	Min to Max	_	_	0.1	_	$I_{OL} = 50 \mu A$
		3.0	_	_	0.44	_	I <sub>OL</sub> = 6 mA
		4.5	_	_	0.55		I <sub>OL</sub> = 12 mA
Input current	I <sub>IN</sub>	0 to 5.5	_	_	±1	μΑ	$V_{IN} = 5.5 \text{ V or GND}$
Quiescent supply current	I <sub>CC</sub>	5.5	_	_	10	μΑ	$V_{IN} = V_{CC}$ or GND, $I_O = 0$
	$\Delta I_{CC}$	5.5	_	_	1.5	mA	One input $V_{IN} = 3.4 \text{ V}$ , other input $V_{CC}$ or GND
Output leakage current	I <sub>OFF</sub>	0	_	_	5	μΑ	$V_{IN}$ or $V_O = 0$ to 5.5 V
Input capacitance	C <sub>IN</sub>	5.0	_	3.0	_	pF	$V_{IN} = V_{CC}$ or GND

Note: For conditions shown as Min or Max, use the appropriate values under recommended operating conditions.

### HD74LV2GT14A

## **Switching Characteristics**

 $\bullet \quad V_{CC} = 3.3 \pm 0.3 \ V$ 

		Ta = :	25°C		Ta = -40 to 85°C			Test	FROM	TO
Item	Symbol	Min	Тур	Max	Min	Max	Unit	Conditions	(Input)	(Output)
Propagation	t <sub>PLH</sub>	_	7.5	12.5	1.0	14.5	ns	C <sub>L</sub> = 15 pF	A or B	Y
delay time	t <sub>PHL</sub>	_	10.0	15.0	1.0	17.0		$C_L = 50 pF$	<del>-</del> '	

•  $V_{CC} = 5.0 \pm 0.5 \text{ V}$ 

		Ta = 25°C		$Ta = -40 \text{ to } 85^{\circ}C$			Test	FROM	ТО	
Item	Symbol	Min	Тур	Max	Min	Max	Unit	Conditions	(Input)	(Output)
Propagation	t <sub>PLH</sub>	_	5.0	7.6	1.0	9.0	ns	$C_{L} = 15 \text{ pF}$	Α	Y
delay time	t <sub>PHL</sub>	_	6.5	9.6	1.0	11.0	_	C <sub>L</sub> = 50 pF	<del>_</del>	

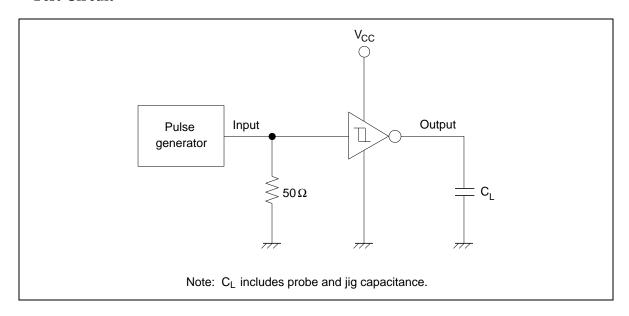
## **Operating Characteristics**

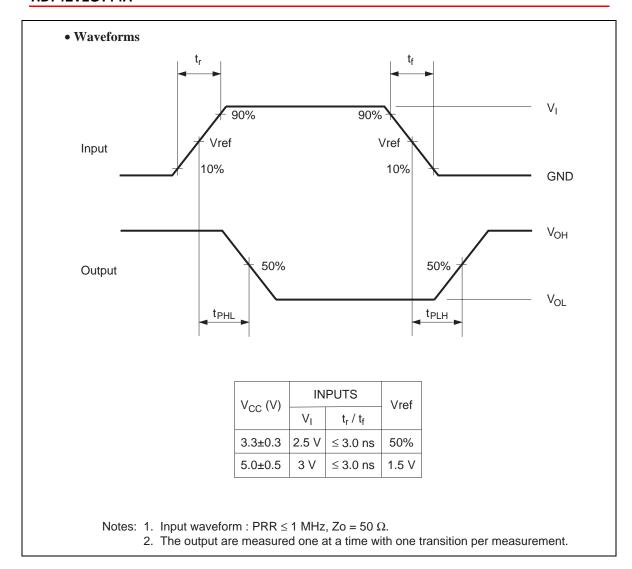
•  $C_L = 50 \text{ pF}$ 

Ta = 25°C

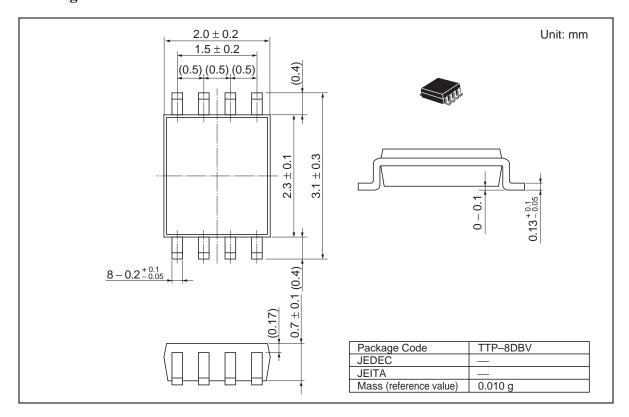
Item	Symbol	V <sub>CC</sub> (V)	Min	Тур	Max	Unit	Test Conditions
Power dissipation capacitance	$C_{PD}$	5.0	_	10.0	_	pF	f = 10 MHz

## **Test Circuit**





## **Package Dimensions**



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